

**CLAIMS**

1. Method of synchronization on the uplink channel of a Simulcast network which comprises a plurality of fixed receivers (BS1-BS4) and a selection unit (20), the method comprising the steps according to which:
  - a) all the receivers are placed in a synchronization search mode (702), in which they search for a synchronization pattern in a radio signal (S) sent by a mobile terminal (MS) on the uplink channel, by scanning a radio channel associated with the uplink channel;
  - b) when one or more receivers (BS2, BS3: Figure 7) receive (703) the radio signal and detect said synchronization pattern, they produce a respective initial synchronization context value (SC2(0), SC3(0)), which indicates the delay between a time reference of the received radio signal and a time reference (To) of the network, and transmit (705) to the selection unit said initial synchronization context value;
  - c) the selection unit transmits (707) to all the receivers respectively the or a predefined one of the initial synchronization context values received in step b);
  - d) each receiver having detected the synchronization pattern in step b) starts processing (704) the radio signal on the basis of the initial synchronization context value that it has produced and/or on the basis of the initial synchronization context value that it has received from the selection unit, while the other receivers start processing (704) the radio signal on the basis of the initial synchronization context value that they have received from the selection unit;
  - e) each receiver, after step d),  
- transmits (709-712) to the selection unit

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useful information frames (VF1(i)-VF4(i)) obtained by processing the radio signal, as well as quality information (QUAL1(i)-QUAL4(i)) or similarity information associated  
5 with each item of useful information in said frames;

- maintains its synchronization context using a synchronization tracking algorithm based on the useful information contained in the radio  
10 signal, and processes the radio signal on the basis of its maintained synchronization context;

- transmits (709-712) the current value (SC1(i)-  
15 SC(i)) of its duly maintained synchronization context to the selection unit, with at least some of the useful information frames;

f) at regular intervals, the selection unit chooses (713) a defined current synchronization context value from the current synchronization context  
20 values respectively transmitted by the receivers, according to a criterion based on the quality information or the similarities respectively associated with the useful information of the corresponding frame, and  
25 transmits (714) the duly selected current synchronization context value to all the receivers.

2. Method according to Claim 1, wherein each receiver,  
30 having detected the synchronization pattern in step b), automatically starts processing the radio signal on the basis of its respective initial synchronization context, as soon as said synchronization pattern is detected, and produces  
35 synchronization quality information, which is transmitted to the selection unit in association with said initial synchronization context.

3. Method according to Claim 2, wherein, in step c),

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the initial synchronization context sent by the selection unit in step c), is chosen (706) by the selection unit, where appropriate from a plurality of initial synchronization contexts respectively sent by receivers in step b), according to a criterion based on the synchronization quality information respectively associated with said initial synchronization contexts.

10 4. Method according to any one of the preceding claims, wherein, in step d), said other receivers start processing the radio signal on reception of the initial synchronization context transmitted by the selection unit.

15 5. Method according to any one of the preceding claims, wherein a new current synchronization context value is chosen by the selection unit on reception of a current synchronization context value every N current synchronization context values successively transmitted by the receivers, in which N is an integer number greater than or equal to unity.

25 6. Method according to Claim 5, wherein N is equal to unity.

30 7. Method according to any one of the preceding claims, wherein, in step f), the selection unit transmits to the receivers a command which makes them switch to the synchronization search mode for want of being able to choose and transmit a current synchronization context value.

35 8. Method according to any one of the preceding claims, wherein the synchronization quality information is calculated from the result of the correlation of the received signal with the synchronization sequence.

9. Method according to any one of the preceding claims, wherein the quality information associated with a frame is deduced from the difference between  
5 the signal received and demodulated on the one hand and the signal received, demodulated and decoded, then re-encoded, on the other hand.
10. Method according to any one of the preceding claims, wherein each receiver transmits to the selection unit, in addition to or in place of the quality information or similarity information associated with a frame, information indicating, where appropriate, that the useful information  
15 transmitted is not relevant from the qualitative point of view.
11. Method according to any one of the preceding claims, wherein, on receiving a current synchronization context value transmitted by the selection unit, each receiver continues processing the radio signal on the basis, either of the current value of its synchronization context, or of said current synchronization context value  
20 transmitted by the selection unit, or of the current value of its synchronization context filtered with said current synchronization context value transmitted by the selection unit.  
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- 30 12. Method according to any one of Claims 1 to 11, wherein the selection unit implements a voting function.
- 35 13. Method according to any one of Claims 1 to 11, wherein the selection unit implements a combination function.
14. Method according to any one of the preceding claims, wherein, before starting the processing in

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step d), at least some of the receivers perform a fine synchronization search limited to a time band corresponding to plus or minus half a symbol time.

5 15. Method according to any one of the preceding claims, wherein, when it detects that the useful information obtained by processing the radio signal is no longer relevant from the qualitative point of view, a receiver performs a fine synchronization  
10 search limited to a time band corresponding to plus or minus half a symbol time.

15 16. Method according to any one of the preceding claims, wherein the processing of the radio signal received from the mobile terminal implements an equalization algorithm or similar.

20 17. Method according to any one of the preceding claims, wherein a synchronization context is a binary word comprising a predefined number q of bits, of which a predefined number q1 of bits encode the integer number of symbol times separating a time reference of the radio signal and a time reference of the network, and a predefined number q2 of bits encode a number of fractions of a symbol time separating said time reference of the radio signal and said time reference of the network, in which q, q1 and q2 are integer numbers.  
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30 18. Method according to Claim 17, wherein q=8, q1=3 and q2=5.

35 19. Simulcast network wherein the receivers and the selection unit are designed to implement a method according to any one of Claims 1 to 18.

20. Network according to Claim 19, also comprising fixed transmitters, which are not co-located with the receivers.